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What is claimed is:

1. A method for decoding a digital signal, comprising:

receiving a multiple-bit digital signal that includes information to be transmitted;

arraying bit strings of the received multiple-bit digital signal to thereby generate a received signal image as a two-dimensional image;

arraying all types of predetermined proper signals used for signals transmitted and bit strings of patterns including errors each derived from each proper signal to thereby generate a different two-dimensional image and disposing a set of received signal patterns, each comprised of an arbitrary proper signal and a group of two-dimensional images of patterns having the arbitrary proper signal added with an error, in a state that enables identification of each proper signal to thereby generate a received signal pattern image;

using optical signal processing to evaluate a coefficient of correlation between the received signal image and the received signal pattern image to thereby obtain a correlation projection image in which depth and brightness intensity distribution is proportional to the coefficient of correlation;

extrapolating transmitted proper signals from a region that includes a maximum point of the depth and brightness intensity distribution appearing in the correlation projection image based on a correspondence between the region and the set of received signal patterns in the received signal pattern image; and

identifying transmitted information from the extrapolated proper signals.

2. The method according to claim 1, wherein the correlation projection image is obtained through the steps of superposing an image having the received signal image Fourier-transformed on an image having the received signal pattern image Fourier-transformed and conjugated to thereby obtain a superposed image, and Fourier-transforming the superposed image.

3. The method according to claim 1, wherein the correlation projection image is obtained through the step of using an incoherent light source to project the received signal image onto a translucent material on which the received signal pattern

image has been recorded.

4. The method according to claim 1, wherein the received signal image is generated as a two-dimensional image through the steps of parallelizing the multiple-bit digital signal transmitted as a serial optical signal and arraying the bit strings of the parallelized multiple-bit digital signal.

5. The method according to claim 2, wherein the received signal image is generated as a two-dimensional image through the steps of parallelizing the multiple-bit digital signal transmitted as a serial optical signal and arraying the bit strings of the parallelized multiple-bit digital signal.

6. The method according to claim 3, wherein the received signal image is generated as a two-dimensional image through the steps of parallelizing the multiple-bit digital signal transmitted as a serial optical signal and arraying the bit strings of the parallelized multiple-bit digital signal.

7. The method according to claim 4, wherein the multiple-bit digital signal transmitted as a serial optical signal is parallelized through the steps of branching the digital signal into optical fibers corresponding in number to the multiple bits and adjusting transmission delay time for each optical fiber.

8. The method according to claim 5, wherein the multiple-bit digital signal transmitted as a serial optical signal is parallelized through the steps of branching the digital signal into optical fibers corresponding in number to the multiple bits and adjusting transmission delay time for each optical fiber.

9. The method according to claim 6, wherein the multiple-bit digital signal transmitted as a serial optical signal is parallelized through the steps of branching the digital signal into optical fibers corresponding in number to the multiple bits and adjusting transmission delay time for each optical fiber.

10. The method according claim 1, wherein the received signal image is generated as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, the received signal pattern image is generated applying the different graphical form to each bit string, and the coefficient of correlation is evaluated using the generated received signal pattern image, thereby improving image matching accuracy.

11. The method according claim 2, wherein the received signal image is generated as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, the received signal pattern image is generated applying the different graphical form to each bit string, and the coefficient of correlation is evaluated using the generated received signal pattern image, thereby improving image matching accuracy.

12. The method according claim 3, wherein the received signal image is generated as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, the received signal pattern image is generated applying the different graphical form to each bit string, and the coefficient of correlation is evaluated using the generated received signal pattern image, thereby improving image matching accuracy.

13. The method according claim 4, wherein the received signal image is generated as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, the received signal pattern image is generated applying the different graphical form to each bit string, and the coefficient of correlation is evaluated using the generated received signal pattern image, thereby improving image matching accuracy.

14. The method according claim 5, wherein the received signal image is generated as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, the received signal pattern image is generated applying the different graphical form to each bit string, and the coefficient

of correlation is evaluated using the generated received signal pattern image, thereby improving image matching accuracy.

15. The method according claim 6, wherein the received signal image is generated as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, the received signal pattern image is generated applying the different graphical form to each bit string, and the coefficient of correlation is evaluated using the generated received signal pattern image, thereby improving image matching accuracy.

16. The method according claim 7, wherein the received signal image is generated as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, the received signal pattern image is generated applying the different graphical form to each bit string, and the coefficient of correlation is evaluated using the generated received signal pattern image, thereby improving image matching accuracy.

17. The method according claim 8, wherein the received signal image is generated as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, the received signal pattern image is generated applying the different graphical form to each bit string, and the coefficient of correlation is evaluated using the generated received signal pattern image, thereby improving image matching accuracy.

18. The method according claim 9, wherein the received signal image is generated as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, the received signal pattern image is generated applying the different graphical form to each bit string, and the coefficient of correlation is evaluated using the generated received signal pattern image, thereby improving image matching accuracy.

19. An apparatus for decoding a digital signal, comprising:

received signal image generation means that receives a multiple-bit digital signal that including information to be transmitted and arrays bit strings of the received multiple-bit digital signal to thereby generate a received signal image as a two-dimensional image;

spatial frequency filtering means that arrays all types of predetermined proper signals used for signals transmitted and bit strings of patterns including errors each derived from each proper signal to thereby generate a different two-dimensional image, disposes a set of received signal patterns, each comprised of an arbitrary proper signal and a group of two-dimensional images of patterns having the arbitrary proper signal added with an error, in a state that enables identification of each proper signal to thereby generate a received signal pattern image, uses optical signal processing to evaluate a coefficient of correlation between the received signal image from the received signal image generation means and the received signal pattern image to obtain a correlation projection image in which depth and brightness intensity distribution is proportional to the coefficient of correlation; and

decoding processing means that extrapolates transmitted proper signals from a region that includes a maximum point of the depth and brightness intensity distribution appearing in the correlation projection image based on a correspondence between the region and the set of received signal patterns in the received signal pattern image and identifies transmitted information from the extrapolated proper signals.

20. The apparatus according to claim 19, wherein the received signal image generation means includes a coherent light source to generate the received signal image, and the spatial frequency filtering means comprises a first lens that Fourier-transforms the received signal image from the received signal image generation means, a matched filter that transfers an image having the received signal image Fourier-transformed and conjugated onto a translucent material, and a second lens that Fourier-transforms a superposed image obtained by the received signal image Fourier-transformed by the first lens being passed through the matched filter to obtain a correlation projection image that is the superposed image

Fourier-transformed by the second lens.

21. The apparatus according to claim 19, wherein the received signal image generation means includes an incoherent light source to generate the received signal image, and the spatial frequency filtering means projects the received signal image onto a correlation filter having the received signal pattern image recorded on a translucent material to obtain the correlation projection image.

22. The apparatus according to claim 19, wherein the received signal image generation means comprises a serial/parallel conversion section that parallelizes bits of received serial signals and outputs the signals as parallel signals, and a display section that displays two-dimensional images based on the parallel signals from the serial/parallel conversion section.

23. The apparatus according to claim 20, wherein the received signal image generation means comprises a serial/parallel conversion section that parallelizes bits of received serial signals and outputs the signals as parallel signals, and a display section that displays two-dimensional images based on the parallel signals from the serial/parallel conversion section.

24. The apparatus according to claim 21, wherein the received signal image generation means comprises a serial/parallel conversion section that parallelizes bits of received serial signals and outputs the signals as parallel signals, and a display section that displays two-dimensional images based on the parallel signals from the serial/parallel conversion section.

25. The apparatus according to claim 22, wherein the serial/parallel conversion section branches the digital signal into optical fibers corresponding in number to the multiple bits and adjusts transmission delay time for each optical fiber to thereby parallelize the digital signal transmitted as a serial optical signal.

26. The apparatus according to claim 23, wherein the serial/parallel conversion section branches the digital signal into optical fibers corresponding in number to the multiple bits and adjusts transmission delay time for each optical fiber to thereby parallelize the digital signal transmitted as a serial optical signal.

27. The apparatus according to claim 24, wherein the serial/parallel conversion section branches the digital signal into optical fibers corresponding in number to the multiple bits and adjusts transmission delay time for each optical fiber to thereby parallelize the digital signal transmitted as a serial optical signal.

28. The apparatus according to claim 19, wherein the received signal image generation means generates the received signal image as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, and the spatial frequency filtering means generates the received signal pattern image applying the different graphical form to each bit string to improve image matching accuracy.

29. The apparatus according to claim 20, wherein the received signal image generation means generates the received signal image as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, and the spatial frequency filtering means generates the received signal pattern image applying the different graphical form to each bit string to improve image matching accuracy.

30. The apparatus according to claim 21, wherein the received signal image generation means generates the received signal image as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, and the spatial frequency filtering means generates the received signal pattern image applying the different graphical form to each bit string to improve image matching accuracy.

31. The apparatus according to claim 22, wherein the received signal image generation means generates the received signal image as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, and the spatial frequency filtering means generates the received signal pattern image applying the different graphical form to each bit string to improve image matching accuracy.

32. The apparatus according to claim 23, wherein the received signal image generation means generates the received signal image as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, and the spatial frequency filtering means generates the received signal pattern image applying the different graphical form to each bit string to improve image matching accuracy.

33. The apparatus according to claim 24, wherein the received signal image generation means generates the received signal image as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, and the spatial frequency filtering means generates the received signal pattern image applying the different graphical form to each bit string to improve image matching accuracy.

34. The apparatus according to claim 25, wherein the received signal image generation means generates the received signal image as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, and the spatial frequency filtering means generates the received signal pattern image applying the different graphical form to each bit string to improve image matching accuracy.

35. The apparatus according to claim 26, wherein the received signal image generation means generates the received signal image as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, and the spatial frequency filtering means generates the received signal

pattern image applying the different graphical form to each bit string to improve image matching accuracy.

36. The apparatus according to claim 27, wherein the received signal image generation means generates the received signal image as a two-dimensional image using a different graphical form to correspond to each bit position in the received signal, and the spatial frequency filtering means generates the received signal pattern image applying the different graphical form to each bit string to improve image matching accuracy.